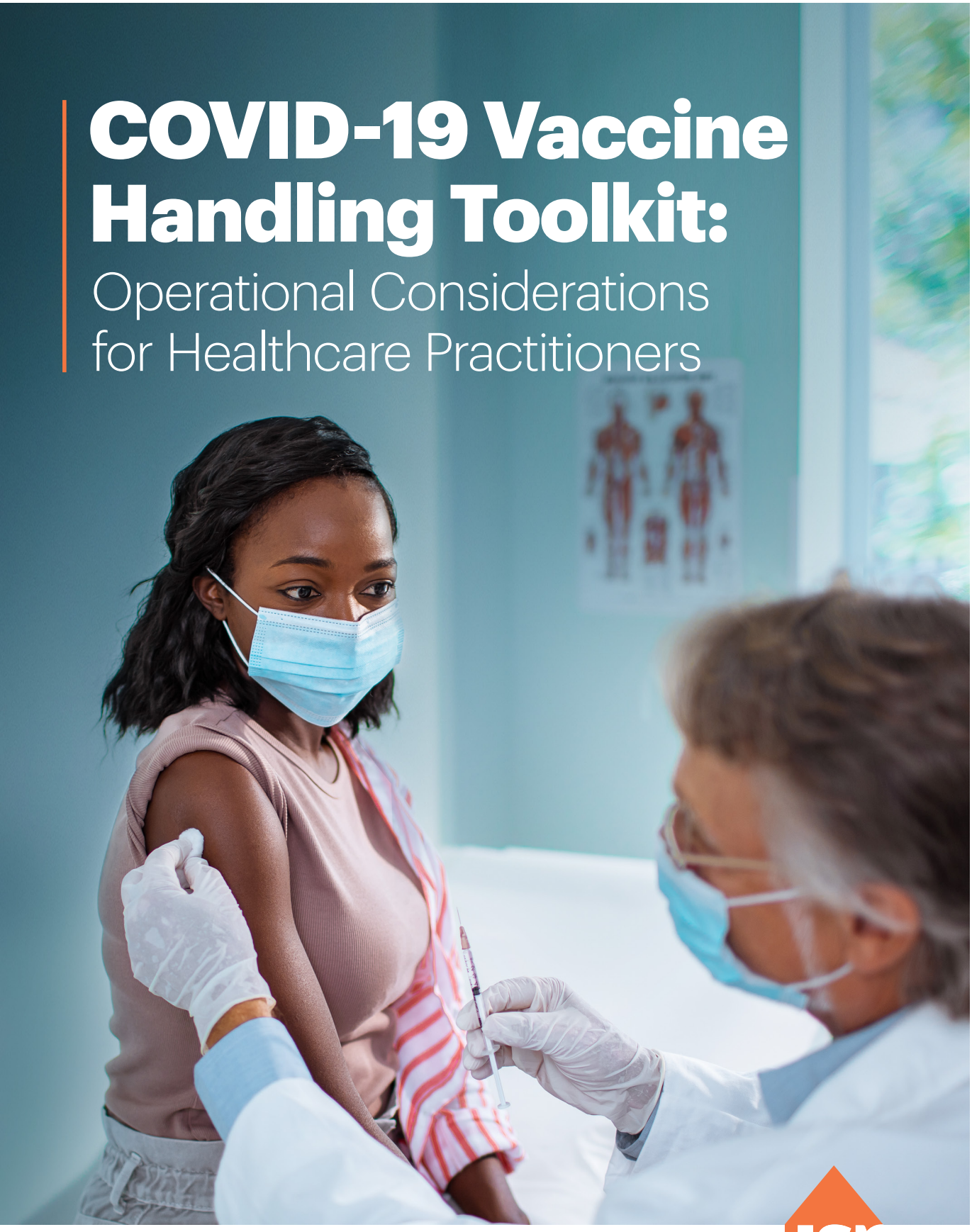
COVID-19 Vaccine Handling Toolkit:

Operational Considerations for Healthcare Practitioners



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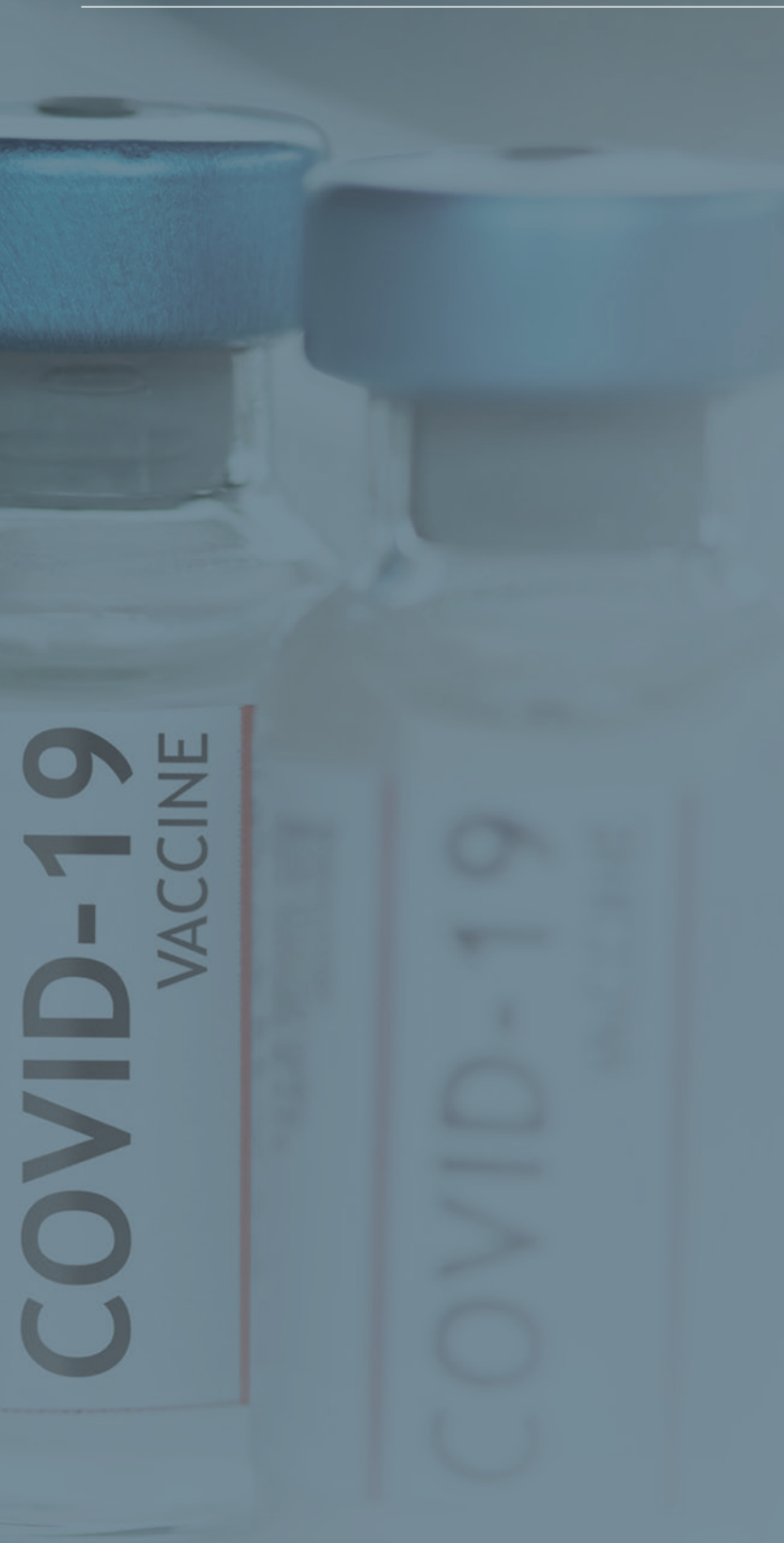

Background and Introduction

The Food and Drug Administration (FDA) has issued Emergency Use Authorizations (EUA) for two new COVID-19 vaccines in the United States. These are both mRNA-based vaccines. However, there is no available data on the interchangeability of the COVID-19 vaccines.[1] Preparing a conventionally manufactured COVID-19 vaccine, such as a vaccine that has received an EUA from the FDA, should be performed in accordance with the directions in the manufacturer's labeling.[2,3] This document focuses on considerations for preparation of COVID-19 vaccines for administration and can be used to supplement a manufacturer's labeling, but not replace them. In addition, this document should not replace a facility's policies and procedures.

The USP Healthcare Safety and Quality Expert Committee (HSQ EC) with experts from the Package and Distribution (PD EC), Nomenclature and Labeling (NL EC), Health Information and Technology (HIT EC) and Compounding (CMP EC) Expert Committees have developed the following operational strategies based on stakeholder input and in anticipation of challenges that may arise during the preparation of these COVID-19 vaccines.

In light of the public health emergency posed by COVID-19, this document was developed without a public comment period. This document is not a USP compendial standard; rather, it reflects considerations developed by the USP HSQ EC and other EC members, based on their scientific and professional expertise, and with input from stakeholders and regulatory agencies.

Disclaimer: This document is for informational purposes only and is intended to address operational considerations for COVID-19 vaccine preparation during the COVID-19 pandemic. This does not reflect the USP Healthcare Safety and Quality Expert Committee's opinions on future revisions to official text of the *USP–NF*. Parties relying on the information in this document bear independent responsibility for awareness of, and compliance with, any applicable federal, state, or local laws and requirements. USP is actively monitoring the evolving situation and will update this document accordingly.

Preparation

Operational Considerations for COVID-19 Vaccine Preparation During the Pandemic (January 19, 2021)

Environmental Considerations for Vaccine Preparation

Achieving and maintaining sterility and overall freedom from contamination of the vaccines is dependent on the environmental conditions under which the preparation process is performed. The following considerations should be made when selecting an environment for preparation of vaccines:

- A dedicated area or room should be utilized for vaccine preparation.
  - The dedicated area or room should be a clean, uncluttered, functionally separate workspace.
  - The dedicated area or room should be away from windows, doors, air vents, etc. to minimize airflow disruptions.
  - Items that are not necessary for vaccine preparation should be removed from the vaccine preparation area (i.e., food, drinks, and other materials).
  - If not possible, alcohol-based hand sanitizer (see USP Hand Sanitizer Toolkit[4], WHO guidance[5]) should be available. For alcohol-based hand sanitizers, the Centers for Disease Control & Prevention (CDC) recommends a concentration of 60% to 95% ethanol or isopropanol (i.e., isopropyl[6]) alcohol[7].
  - Whenever possible, the area dedicated for vaccine preparation should not be located in or close to where environmental control challenges could negatively affect the air quality (e.g., restrooms, warehouses, or food preparation areas).
- Equipment to include in the dedicated area or room may comprise of sharps container, alcohol swabs, sink and/or hand sanitizer, and materials for personnel hygiene and garbing.
- When manufacturer labeling permits, COVID-19 vaccines can be prepared in ambient air without using a Primary Engineering Control (PEC) device (e.g., prepared outside of an ISO Class 5 air environment). A PEC is defined as a device or zone that provides an ISO Class 5 air environment which minimizes the risk of microbial contamination.
- Understanding that the vaccine preparation will take place across a variety of practice settings, it is important to adhere to aseptic technique to ensure the quality and safety of the preparation of these vaccine products
  - Clean and disinfect the surface where the vaccine preparation will take place using a solution of at least 70% isopropyl alcohol or optionally utilize clean preparation mats per your institution's policy and procedures.

Personnel Hygiene and Garbing

Healthcare workers who supervise the preparation of the vaccines should ensure that personnel are adequately skilled, educated, and trained to correctly perform preparation of the COVID-19 vaccines. Before beginning preparation of COVID-19 vaccines, personnel should consider the following aspects of hygiene and garbing:

- Personnel should remove hand, wrist, and other exposed jewelry that could interfere with the effectiveness of garbing or otherwise increase the risk of contamination of the vaccines.
- Fingernails should be clean and neatly trimmed to minimize particle shedding and avoid glove punctures.
- Personnel should perform hand hygiene by washing hands with soap and water for at least 30 seconds or use hand sanitizer rubbed between hands and fingers and allowed to dry.
- Personnel should don powder-free gloves before preparing vaccines for administration. Powder-free gloves should be inspected regularly for holes, punctures or tears and must be replaced immediately if such defects are detected.
- Personnel should don and replace garb (e.g., masks, freshly laundered lab coat, powder-free gloves, clean scrubs) immediately if it becomes visibly soiled or if its integrity is compromised.

Basic Aseptic Considerations for Vaccine Preparation

Aseptic technique is a set of processes used to keep objects and areas free of microorganisms and thereby minimize infection risk to patients. Aseptic technique should be utilized to prepare vaccines for administration in order to prevent the vaccines from being contaminated with microorganisms from the environment or from the persons preparing them. Manufacturer supplied information on the steps for thawing, storage temperatures, and preparation of the available COVID-19 vaccines are provided on the Pfizer-BioNTech and Moderna COVID-19 resource webpages.[2,3] Aseptic technique considerations for vaccine preparation should include the following:

- Follow institutional and regulatory requirements related to competency, training, or certification of vaccine preparation and administration, as appropriate
- Inspect vials for cracks or leaks prior to proceeding further.
- Disinfect entry points on the diluent and vaccine vials (e.g., vial stoppers) by wiping the vials with single-use alcohol swabs. Allow the alcohol to dry before piercing stoppers with sterile needles.
- During preparation of the vaccine, personnel should avoid touching critical parts of the components being used for preparation of the vaccines (e.g., needles, disinfected vial stoppers) in order to minimize microbial contamination.
- Place all used syringes, needles, vials into puncture-proof containers (e.g., sharps container) and dispose the containers according to regulatory requirements.

Withdrawing doses

Manufacturer supplied information on the steps for preparation of the available COVID-19 vaccines are provided on the Pfizer-BioNTech and Moderna COVID-19 vaccine resource webpages.[2,3] Additional considerations, including how to ensure complete doses are withdrawn and safe practices include the following:

- If applicable, ensure needle and syringe are tightly luer-locked together.
- Consider using the smallest syringe appropriate for the dose to improve dose accuracy. For example, a 0.3 mL or 0.5 mL dose should be drawn up using a 1 mL syringe.
- The same needle should be used for withdrawal and administration. This eliminates the need to change needles and therefore reduces the risk of touch contamination to the vaccine and potential loss of volume.
- Exercise care to avoid contaminating or bending the needle if being used for both withdrawal and administration.
- Refrain from using transfer devices, mini spikes, or using one needle to prepare multiple syringes due to potential loss of medicine in dead space.
- Refrain from using dispensing pins or needless devices due to risk of vaccine loss or incompatibility with materials. These devices have not been tested and may result in damage to the stopper and loss of integrity of the vial.
- Utilize safe practices when recapping the needle after withdrawing and before administration.
- In the case of excess air bubbles in the syringe, small bubbles can be ignored. Personnel should avoid tapping the syringe due to theoretical risk of inactivating the vaccine or degraded quality.

Pfizer-BioNTech COVID-19 Vaccine Considerations

- Manufacturer supplied information on the steps for dilution is available on the Pfizer-BioNTech COVID-19 vaccine resources webpage.[2]
- Regardless of diluent vial size, only a single needle entry can be used to withdraw a single 1.8 mL volume of preservative-free 0.9% sodium chloride diluent to prepare one vial of the Pfizer-BioNTech COVID-19 vaccine. Any excess diluent must be discarded.
- It has been shown that the Pfizer-BioNTech COVID-19 vaccine vials can produce more than 5 doses per a single vial.
- The manufacturer recommends preferentially using a low dead-volume *syringe* and/or *needle* to extract 6 doses from a single vial.[2] A low dead-volume *syringe* is designed to limit dead space that exists between the syringe hub and needle. A low dead-volume *needle* is designed with less space between the needle and the plunger.
- The manufacturer provides that for dose preparation, a 21-gauge or narrower needle helps prevent leaking from the stopper when doses are withdrawn.
- A combination of low dead-volume syringes and non-low dead-volume syringes could also maximize doses withdrawn (e.g., 3 low dead-volume syringes and 3 non-low dead-volume syringes). This is to ensure practice settings consistently pursue 6 doses per Pfizer-BionNTech COVID-19 vaccine vial regardless of ancillary kits mixture of needle/ syringe types (low dead volume and non low dead volume) to more consistently achieve maximum doses withdrawn.

Moderna COVID-19 Vaccine Considerations

- Some practice settings have reported being able to withdraw more than 10 doses of a single vaccine vial. The FDA has issued guidance allowing this usage.[1]
- The manufacturer provides that for dose preparation, a 20-22-gauge needle is recommended and for administration a 22-25-gauge needle. A single 22-gauge needle can be used to both draw up and administer the vaccine.

Beyond-Use Dating Considerations for Pre-drawn Syringes

We recognize that practice settings may benefit from certain operational efficiencies that support a separation of the vaccine preparation steps from vaccine administration to the patient. For example, this may be when a practice setting prepares and pre-draws vaccine into syringe in one area and then transports the pre-drawn syringes to a different site for administration. If pre-drawn syringes are used, consider the following manufacturer released information supporting stability data of vaccine pre-drawn into syringes:

Pfizer-BioNTech COVID-19 Vaccine

- Pfizer has conducted physical and chemical stability studies which have shown that the vaccine maintains all its measured quality attributes when diluted vaccine is stored in polycarbonate and polypropylene syringes with stainless steel needles for 6 hours at 2°C to 25°C (35.6°F to 77°F) after the source vial is diluted.
- Microbiological risk was assessed through a microbiological challenge study which showed that microbiological growth has a greater potential to occur after 6 hours. The hold time of 6 hours, from the time the source vial is diluted, is not specifically tied to a preparation environment and can be applied to doses prepared outside of ISO Class 5 environment (PEC).
- Keep out of direct sunlight.

Moderna COVID-19 Vaccine

- According to the Chemistry, Manufacturing and Control (CMC) department at Moderna, pre-drawn syringes can be either stored in the refrigerator at 2° to 8°C (36° to 46°F) or at ambient room temperature at 15° to 25°C (59° to 77°F) provided they are administered within 6 hours of the first time the source vial is punctured.
- Per the manufacturer, common disposable syringes made of polypropylene or polycarbonate are suitable for use.
- Keep out of direct sunlight.

Labeling Considerations

When the COVID-19 Vaccines are not being prepared for immediate administration, appropriate labeling considerations should be undertaken. If the vaccines are sent outside the facility in which they were prepared for administration, a designated person must ensure that contact information of the preparation facility is conveyed and available at the site where they will be administered. Labels should be adhered to the container(s) (e.g., light protected zip-lock bag in which pre-drawn syringes are stored and transported). Pre-drawn syringes prepared for administration must be labeled with legible identifying information to prevent errors during storage, dispensing, transport and use.

Personnel should consider adding the following labeling components to the containers in which the pre-drawn vaccine syringes are stored as well as the pre-drawn vaccine syringe.

Container labeling components:

- Facility name and phone number
- Quantity of syringes
- Name and amount of vaccine
- The exact beyond-use date and time (e.g., 6 hours for pre-drawn syringes for both Pfizer-BioNTech and Moderna COVID-19 vaccines from when the vaccine is diluted or the first dose is withdrawn from vial, respectively)[2,3]
- Lot number
- Initials of preparer

Examples of pre-drawn syringe storage container labels

Pfizer-BioNTech COVID-19 Vaccine (30 mcg / 0.3 mL) IM suspension
Facility name and phone number:
Quantity of syringes:
Date & Time to discard (6 hours after dilution):
Lot #:
Initials of preparer:

Moderna COVID-19 Vaccine (100 mcg / 0.5 mL) IM suspension
Facility name and phone number:
Quantity of syringes:
Date & Time to discard (6 hours after puncture):
Lot #:
Initials of preparer:

Pre-drawn syringe labeling components

- Name and amount of vaccine
- The exact beyond-use date and time (e.g., 6 hours for pre-drawn syringes for both Pfizer-BioNTech and Moderna COVID-19 vaccines from when the vaccine is diluted or the first dose is withdrawn from vial, respectively)[2,3]
- Lot number
- Initials of preparer

Examples of pre-drawn syringe labels

Pfizer-BioNTech COVID-19 Vaccine (30 mcg / 0.3 mL) IM suspension
Date & Time to discard (6 hours after dilution):
Lot #:
Initials of preparer:

Moderna COVID-19 Vaccine (100 mcg / 0.5 mL) IM suspension
Date & Time to discard (6 hours after puncture):
Lot #:
Initials of preparer:

References

1 https://www.fda.gov/emergency-preparedness-and-response/mcm-legal-regulatory-and-policy-framework/moderna-covid-19-vaccine-frequently-asked-questions

2 https://www.cvdvaccine-us.com/resources

3 https://www.modernatx.com/covid19vaccine-eua/providers/

4 https://www.usp.org/covid-19/hand-sanitizer-information

5 https://www.who.int/gpsc/5may/Guide_to_Local_Production.pdf

6 https://www.cdc.gov/niosh/npg/npgd0359.html

7 https://www.cdc.gov/coronavirus/2019-ncov/hcp/hand-hygiene.html